NASA BALLOON PROGRAM

NATIONAL SCIENTIFIC BALLOON FACILITY

PAYLOAD SAFETY PROCESS

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General

This document will outline NSBF's process of certifying and documenting that a balloon payload is in compliance with applicable safety requirements during integration and launch. It addresses the tasks, responsibilities, submittals, safety reviews/meetings, and schedules associated with the process. The philosophy of the NSBF payload safety process is that the NSBF scientific user is responsible for insuring that the payload is in compliance with NSBF policy. NSBF is responsible for checking, monitoring, and documenting compliance.

From a safety standpoint, payloads flown by NASA's Balloon Program pose reduced risks in comparison to other NASA Expendable Launch Vehicles. Hazards associated with balloon payloads fall into a somewhat limited and generic set of safety considerations. Standard safety hazards in ballooning can be categorized as follows.

- Radioactive Sources
- Lasers
- Chemical Hazards
- Pressure Vessels
- High Voltage
- Contained Pyrotechnics

Safety compliance requirements for the above hazards are addressed in the "NASA Balloon Program Ground Safety Plan". Identified safety hazards that fall outside these areas are handled through separate safety plans and reviews. The following paragraphs describe the process. Table 1 is an abbreviated depiction of the NSBF Payload Safety Process.

1. Initiate Project and Document Safety Assessment

1.1 Identify Hazards Falling Within NSBF Ground Safety Plan. The NSBF Flight Application Form is sent out to prospective users in July of each year. The form includes a safety questionnaire covering hazards normally associated with balloon payloads. The NSBF Ground Safety Plan is attached to the Flight Application so the prospective user can identify safety issues and determine whether the payload is in compliance with NSBF Policy.

1.2 Identify Hazards Falling Outside NSBF Ground Safety Plan. The Flight Application also contains questions about safety hazards not covered in the Ground Safety Plan. This is the means whereby special cases are identified and flagged. The Flight Application requests that the user forward all home institution safety documentation to NSBF. Most balloon payloads originate at NASA centers or universities. Users are usually required to undergo rigorous safety processes at their home institutions while building up their instrumentation. This documentation is used by NSBF as a further check of compliance with safety requirements.

1.3 User Verification of Compliance with NSBF Ground Safety Plan. The principle investigator is required to submit signed documentation indicating that the payload is in compliance with NSBF safety

standards delineated in the Ground Safety Plan. This form is sent to NSBF prior to shipment of the payload to the launch site.

1.4 User Prepared Special Safety Plans. When the user identifies a safety issue falling outside those covered in the NSBF Ground Safety Plan (i.e. superconducting magnet, toxic gas, etc), a separate safety plan must be prepared by the user and submitted to NSBF for review. The NSBF Safety Officer is responsible for review of these plans for compliance with established industry safety standards.

2. Conduct Safety Reviews

2.1 Review Standard and Special Payload Safety Issues and Plans. Program Review Meetings are held monthly at NSBF to discuss support of upcoming campaigns and operations. Flight Applications and project files are reviewed in some detail. Safety related status, concerns, and issues are discussed. Action items on safety compliance are documented and tracked.

2.2 Resolve Open Safety Concerns, Action Items, and Discrepancies. Response and close of safety related action items for each upcoming operation are discussed at the monthly Program Review Meetings. Closer of action items are the responsibility of the Operations Manager or the assigned Campaign Manager. Emphasis is placed on insuring that applicable safety documentation is at NSBF prior to shipping the instrumentation to the launch site.

3. Finalize and Approve Safety Assessments/Plans

3.1 Prepare Balloon System Pre-Launch Safety Package (BSPSP). Immediately following the scientist's arrival at the launch site, a Flight Requirements Meeting is held. The Flight Application Form is reviewed for compliance with standard and special safety issues prior to beginning of payload integration. The signed Payload Safety Compliance form, special safety plans for non-standard hazards, and user institution safety documentation is reviewed, discussed, and assembled into the Balloon System Pre-Launch Safety Package (BSPSP). Unresolved issues, if any are referred to the NSBF Safety Officer. The completed BSPSP package serves as a formal approval of the project from a safety standpoint.

4. Periodic Compliance Checks

4.1 Verify Compliance with Safety Procedures/Plans. The NSBF Operations Manager or Campaign Manager is responsible for periodic inspection of integration areas for compliance with routine and special safety procedures and plans. These inspections will typically take place on at least a bi-weekly basis.

5. Pre-Launch Review

5.1 Review Applicable Safety Plans with Flight Line Personnel. Flight Readiness Review meetings are held once the science payload is flight ready and no sooner than 72 hours prior to a scheduled launch. Standard flight line payload safety procedures and special safety plans, if any, are reviewed with cognizant personnel. Checklists are used to insure safety compliance. These meetings are rescheduled every 72 hours should a launch delay occur.

5.2 Recovery Plan. A completed form indicating step by step instructions for safe payload handling during recovery operations is submitted by the principle investigator at the Flight Readiness Review meeting. This form is reviewed and approved by the Flight Director. Should extraordinary safety measures be necessary during recovery, a formal plan is written, reviewed, and discussed with recovery personnel.

6. Documentation

Table 2 lists documentation generated during the Payload Safety Process, who is responsible for generating it, and required signatures on the accompanying documentation. At the conclusion of each flight, all payload safety documentation will be archived in the flight folder.

Document(s)	Responsible Party	Required Signatures
Flight Application Form	Science P.I.	Science P.I.
Special Safety Plans	Science P.I.	Science P.I.
User Institution Safety Documentation	Science P.I.	User Institutional Safety Office Representative
Verification of Safety Compliance Form	Science P.I.	Science P.I./NSBF Ops Manager
Program Review Meeting Action Item and Closure	NSBF Operations Manager	NSBF Operations Manager
BSPSP	NSBF Campaign Manager	NSBF Campaign Manager
Pre-Flight Readiness Meeting Checklist	NSBF Flight Director	NSBF Flight Director
NSBF Recovery Form	Science P.I.	Science P.I./NSBF Operations Manager

Table 1
Payload Safety Process Documentation

Table 2
NSBF Payload Safety Process

Task #	Safety Task Description	Responsibility	Product or Meeting	Schedule
	INITIATE PROJECT AND DOCUMENT SAFETY ASSESSMENT			
1.1	Identify safety hazards falling within NSBF Ground Safety Plan.	NSBF Operations Manager	Flight Application document delineating standard safety issues.	3-9 months prior to payload shipment to launch site.
1.2	Identify safety hazards falling outside of standard NSBF Ground Safety Plan.	NSBF Operations Manager	Flight Application document delineating special safety considerations.	3-9 months prior to payload shipment to launch site.
1.3	User prepared special safety plan for hazards not covered in NSBF Ground Safety Plan.	Science Principle Investigator	Written Safety Plan for special hazards.	1 month prior to shipment to launch site.
	CONDUCT SAFETY REVIEWS			
2.1	Review Standard and Special Payload Safety Issues and Plans	NSBF Site Manager/Operations Manager	Program Review Meetings. Safety-related concerns/issues and action items documented in meeting minutes	At least monthly beginning 3 months prior to shipment to launch site.
2.2	Resolve open safety concerns, action items and discrepancies	NSBF Operations Manager	Program review Meetings-Response and closure of concerns and action items.	As assigned.
	FINALIZE AND APPROVE SAFETY ASSESSMENTS/PLANS			
3.1	Prepare final Balloon System Prelaunch Safety Package (BSPSP).	NSBF Operations Manager/Campaign Manager	Flight Requirements Meeting. Assemble Payload Safety Compliance Form, safety plans for non-standard	Immediately following arrival at launch site.

			hazards, and user institution safety documentation.	
	PERIODIC COMPLIANCE CHECKS			
4.1	Verify that procedures/plans are being followed.	NSBF Operations Manager/Campaign	Verbal warning of science users or written discrepancy reports (depending on severity)	Periodic from payload arrival at launch site through launch.
	PRELAUNCH REVIEW			
5.1	Review applicable routine and special safety issues and plans with flight line personnel	NSBF Flight Director	Flight Readiness Meeting. Completed pre-flight checklists.	<72 hrs prior to launch
5.2	Recovery Plan	NSBF Flight Director	Flight Readiness Meeting. Completed Recovery Form or plan	<72 hrs prior to launch

Table 2 (cont)